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SOUTHERN LOUISIANA FROM THE CAR-WINDOW

By Roland M. Harper

Louisiana is one of the two states in the Union that is all coastal plain (Florida being the other). The southern half of the state, although essentially flat and hardly anywhere more than 150 feet above sea-level, has considerable diversity of soil, which is reflected in the vegetation as well as in the population and agricultural features. The agricultural regions of the state were well mapped and described by Dr. E. W. Hilgard in the fifth volume of the Tenth Census, 1884, and the same divisions with slight modifications were used in a report on forest conditions in Louisiana by J. H. Foster (U. S. Forest Service Bull. 114. 1912*), and in a colored "Phytogeographic map of Louisiana," on a scale of about 18 miles to the inch, which has been issued in several editions in recent years by the State Department of Agriculture and Immigration. Additional geographical details can be found in the soil surveys of several parishes and similar areas published by the U. S. Department of Agriculture, and in Water Supply and Irrigation Paper 101 of the U. S. Geological Survey, on the underground waters of southern Louisiana, by G. D. Harris and others (1904), which contains among other things a map showing the distribution of forests, prairies and marshes in the neighborhood of Lake Charles.

Existing descriptions of the vegetation of southern Louisiana are not very numerous or voluminous. There are of course a few local lists of plants, and monographic works that cite Louis-

* Reviewed, with a reduced copy of the map, in Geog. Review 2: 475–476. Dec. 1916.

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iana specimens, but those are of little interest to the plant sociologist. The vegetation of the several regions of the state was sketched by Hilgard in the census report above mentioned and in one or two preliminary papers that preceded it. Nearly fifty years ago Prof. A. Featherman of the Louisiana State University published two or three official reports on botanical surveys in Louisiana, and that for 1781 contains an interesting description of the prairies in the southern part of the state.

Prof. S. M. Tracy, in Bulletin 15 of the Division of Agrostology of the U. S. Department of Agriculture, 1898 (pp. 10–11), published some notes on prairie grasses of southern Louisiana, with a list of about 19 species, including several weeds. Andrew Allison, in a paper on the birds of West Baton Rouge Parish, in the Auk (21: 472–483) for October, 1904, devoted about two pages to vegetation, giving technical names of several of the most characteristic plants. In the same magazine for January, 1906, the same author and two others sketched the geography of the whole state, with a regional map patterned after Hilgard's, and a few notes on vegetation. In Torreya (6: 201–203) for October, 1906, I described the vegetation of some swamps near New Orleans as it appeared in midwinter.

Prof. R. S. Cocks, in Bulletin 7 of the Gulf Biologic Station at Cameron, La., published by the State Board of Agriculture and Immigration in 1907, entitled The Flora of the Gulf Biologic Station, devoted about two pages (out of 42) to classifying the plants in the vicinity of the station by habitat, and more than six pages to the flora of the prairies west of Lafayette. Two other papers by the same author, namely, Grasses of Louisiana (Bull. 10, Gulf Biol. Sta., 1908), and Leguminosae of Louisiana (Bull. 1, La. Nat. Hist. Surv., 1910), have assisted me in identifying the plants seen on the trips described below. Another interesting contribution by Prof. Cocks, dealing with a part of southern Louisiana that I have not seen, is the first of a projected series of "Notes on the Flora of Louisiana," in the Plant World (17: 186–191) for June, 1914, which describes the fertile loess hills north of Baton Rouge from a floristic standpoint.

My first opportunity to see any part of Louisiana west of New

Orleans came in July, 1915, when on the way from Florida to California.' Leaving New Orleans shortly before midnight of the thirteenth on the main line of the Southern Pacific system (which operates in Louisiana under the aliases of Morgan's Louisiana & Texas R. R., and Louisiana Western), I traveled in a day coach so as to be able to begin taking notes as soon as there was light enough, although that deprived me of any protection from mosquitoes (for it would hardly be worth while to put screens on a car that runs all the way from New Orleans to Los Angeles and is exposed to mosquitoes only about one tenth of the distance). Daybreak (about 4:30 a.m.) on the 14th found me at Lafayette, 145 miles from New Orleans and just west of the alluvial bottoms of the Mississippi delta. The mosquitoes which had made sleep impossible during the night soon disappeared, and as the locomotive used oil for fuel there was nothing to interfere with botanical observations except the speed of the train and my unfamiliarity with some of the plants. Lake Charles, the metropolis of southwestern Louisiana, was passed a little before 7 o'clock, and the Sabine River at the western border of the state about 7:45.

A little over three years later, when on the way to Texas on an errand for the U. S. Bureau of Plant Industry, I crossed Louisiana by a different route, a little farther north. On the afternoon of August 19, 1918, I went from New Orleans to Baton Rouge by the Yazoo & Mississippi Valley R. R., and on the 20th from Baton Rouge westward to the Sabine River and beyond by the New Orleans, Texas & Mexico Ry. (Gulf Coast Lines, formerly a part of the Frisco System), which uses the Y. & M. V. tracks southeast of Baton Rouge and the Kansas City Southern from DeQuincy, La., to Beaumont, Tex., and burn oil like the Southern Pacific and several other southwestern railroads. The two trips together took me through four or five different kinds of country, whose vegetation will be sketched below.

The flood-plain and delta of the Mississippi River have generally been mapped as a unit in Louisiana, except for the separation of the treeless marshes near the coast from the originally densely wooded portion farther inland. There are some sig-

nificant differences, however, between the alluvial lands at the northern edge of the state and those in the latitude of New Orleans. The soil of extreme northeastern Louisiana is hardly surpassed in productiveness anywhere in the world; but there is a progressive decrease in fertility going downstream from there, for two different—but not wholly independent—reasons. First, on approaching the mouth of the river the seasonal fluctuation of the water diminishes, and with it the opportunities of the soil for aëration;* and second, because of the pronounced increase of late summer rainfall toward the Gulf coast, the soils in that direction must be more thoroughly leached.† The variations in soil fertility are brought out very well by census statistics on the use of commercial fertilizers.‡ In 1909 the farmers in the alluvial parishes above Baton Rouge spent only 7 cents for fertilizers for every acre of improved land in 1910, those between Baton Rouge and New Orleans $1.23, and those below New Orleans $2.22.

In northern Louisiana the alluvial lands are largely devoted to cotton, while about Baton Rouge sugar-cane becomes the leading crop, and that gradually gives way to rice below New Orleans. A northeast-southwest line drawn across the delta a little above Baton Rouge separates the cotton and sugar-cane regions pretty well, and the difference is reflected in the vegetation, as will be shown farther on.

The Sugar-cane Region

From New Orleans to Baton Rouge (88 miles) and about ten miles west of the latter place, or about to the boundary between the parishes of West Baton Rouge and Pointe Coupee, I was in the sugar-cane region, where vast fields of cane, hiding all but the roofs of the one-story houses, are the most conspicuous feature of the late summer landscape. Corn and rice rank next to cane in acreage, the former often planted with velvet beans or sugar-cane in alternate rows. Rice was being threshed at the time I passed by, and the piles of chaff were often burned to get

* See Torreya 11: 223. 1911.

† See Science II. 48: 208–211. Aug. 30, 1918.

‡ See Science II. 42: 500–503. Oct. 8, 1915.

rid of them. The houses are mostly aggregated in villages, each village with its sugar-mill. Water for domestic purposes is generally taken from cisterns, as in numerous other fertile regions. The forests are reduced to scattered remnants, mostly along streams. The commonest trees seem to be *Salix nigra* (?), *Populus deltoides, Liquidambar, Platanus, Taxodium distichum, Ulmus americana,* and *Celtis* sp., in the order named. There are hardly any erect shrubs, but three woody vines, *Rhus radicans, Tecoma radicans,* and *Ampelopsis arborea* are fairly common. The epiphyte *Tillandsia usneoides* is the only native herb that is at all conspicuous, the other herbs noted being mostly weeds, such as *Ambrosia trifida* and *Paspalum Vaseyanum.*

The Cotton Region

From about Westover to Opelousas, 49 miles, on the Gulf Coast Lines, the country is still flat and alluvial, but about half wooded, with less cane and more cotton than had been seen the day before. Several sawmills were passed, and the forests had been damaged a good deal by lumbering, draining, grazing, etc. The commonest plants in that distance, which is through the cotton region of the Mississippi bottoms, seem to be as follows:

Trees

Liquidambar Styraciflua
Salix nigra (?)*
Taxodium distichum
Acer Drummondii (?)
Celtis sp.
Populus deltoides
Quercus texana (?)
Gleditsia triacanthos
Fraxinus americana (?)
Quercus nigra
Hicoria aquatica (?)
Acer Negundo

Shrubs and Vines

Ampelopsis arborea
Rhus radicans
Sabal glabra
Cephalanthus occidentalis
Tecoma radicans
Brunnichia cirrhosa

* If this is *S. nigra* it grows taller and straighter here than it usually does elsewhere.

Herbs (all weeds)

Chamaecrista robusta (?)
Helenium tenuifolium
Croton capitatus
Verbena angustifolia (?)
Piaropus crassipes

The Prairies

Dr. Hilgard distinguished three kinds of prairie in southern Louisiana, all contiguous, namely, brown loam on the northeast, gray silt on the west, and black calcareous on the south, next to the coast marshes. I crossed all three, but on account of the relatively small extent of natural vegetation remaining and the inherent difficulty of identifying herbs from a fast train, on a route traversed only once, I will not attempt to separate them at this time. On the more southerly route the ground-water level is pretty close to the surface, and the railroad is built on a low embankment most of the way, while on the other route, 15 or 20 miles farther north, the prairies are comparatively high and dry (though not over 75 feet above sea-level), which probably makes as much difference in the vegetation as the composition of the soil does.

The prairie country stretches westward from Opelousas and Lafayette at the edge of the Mississippi bottoms to the bottoms of the Calcasieu River, and like most prairies is almost perfectly level. Toward the western edge, however, in the gray silt prairies, there are numerous low mounds rising a foot or so above the general level, which make the vegetation a little more diversified than it would be otherwise. There are also quite a number of strips and patches of timber, mostly along streams, so that one hardly ever has an unobstructed view of more than two or three miles in any direction. Eastward the trees are all deciduous, but toward the west pines appear in increasing numbers, mostly *Pinus Taeda* on the northern route and *P. palustris* on the southern route. Where the prairie is bordered by deciduous forests the boundary is sharp, but the edge of the pine forest is ill-defined, probably on account of fire, as on the Hempstead Plains of Long Island.*

* See Mem. Torrey Club **17**: 271. 1918.

The original prairie vegetation is now nearly all replaced by fields and pastures. In St. Landry Parish sometimes as many as fifty farm-houses can be seen at once, between stations, each with a few trees around it, and most of them with "French" chimneys of sticks and mud. Water is usually obtained from cisterns, as in the delta. Rice, corn and cotton are the leading crops, in order of acreage. The commonest native and naturalized plants seem to be as follows:

Trees

Liquidambar Styraciflua
Pinus Taeda
Quercus stellata
Pinus palustris
Quercus Phellos
Hicoria alba
Nyssa sylvatica (?)
Quercus falcata
Quercus Michauxii
Taxodium distichum

Shrubs

Myrica pumila
Cephalanthus occidentalis
Baccharis halimifolia

Herbs

Paspalum Vaseyanum
Panicum hemitomon
Helenium tenuifolium
Eryngium yuccifolium
Mesadenia lanceolata
Tillandsia usneoides
Hibiscus incanus (?)
Nama ovata (?)
Gaura Lindheimeri
*Baptisia leucophaea**
Dracopis amplexicaulis (?)
Croton capitatus
Silphium laciniatum
Typha latifolia
Baptisia sp.
Sesbania macrocarpa (?)

The trees are mostly along streams, as above stated, and *Myrica pumila* occurs near the pine forests, especially on mounds, where it can keep its roots reasonably dry. The first and third herbs listed are obnoxious weeds, and the second grows in wet places

* In Robinson & Fernald's Manual this is treated as synonymous with *B. bracteata* Ell., a species known only from dry woods in Georgia and Alabama (see Bull. Torrey Club 33: 533. 1906), but the range attributed to it excludes those two states entirely.

and may be more characteristic of the marshes south of the prairies.

Outside of Louisiana and Texas these prairies probably have their nearest counterpart in the Grand Prairie of Arkansas,* which although considerably nearer to centers of ecological activity is even less known botanically than the Gulf coast prairies.

The Long-leaf Pine Region

West of the prairies are the long-leaf pine forests, about fifty miles wide on my northern route, but hardly extending south of Lake Charles at all. The topography where I crossed is gently rolling (doubtless a little more hilly farther north), with grayish loamy soil and clayey subsoil, and very few streams (unlike most of the pine-barrens of the Atlantic slope, where the sandy soil holds considerable water which seeps out in the valleys gradually throughout the year). Mosquitoes were rather abundant, though, strange to say. The region is very sparsely settled, and even yet lumbering seems to be more important than farming.

Pinus palustris outnumbers all other trees by a large majority, and on uplands where the lumberman has not yet begun operations it makes a pure stand with no woody undergrowth of any kind. These pine forests are denser than most of those east of the Mississippi River, as observed long ago by Dr. Mohr,† who found, probably in what is now Beauregard Parish, 35,000 board feet on a single acre,—which is several times the average for the southeastern pine forests.

Just two weeks before my 1918 visit southwestern Louisiana had been swept by a hurricane, and in some places as many as 10 per cent. of the pines had been blown down, and many leaves and branches stripped from the deciduous trees. The commonest trees besides the long-leaf pine seem to be *Nyssa biflora* (?), *Liquidambar, Pinus Taeda, Magnolia grandiflora, Quercus Michauxii, Fagus, Nyssa uniflora, Quercus falcata, Q. alba, Taxodium distichum,* and *Ilex opaca,* in the order named. These

* See Plant World 17: 40–44. 1914.

† See page 45 of the revised edition of his "Timber pines of the southern United States" (U. S. Forestry Bull. 13), 1897.

are chiefly confined to the vicinity of streams, like the trees in the prairies. The only common shrubs seem to be *Callicarpa Americana* and *Myrica cerifera.* The herbaceous flora was difficult to identify from a moving train, but it seems decidedly poorer in species than that of the southeastern pine-barrens, and not many plants were in bloom in August. The most abundant herb is a coarse grass, presumably an *Andropogon,* and the most conspicuous were two species of *Laciniaria,* which I have guessed to be *L. pycnostachya* and *L. acidota.* (A little later I had opportunity to examine the pine-barrens more closely in eastern Texas, and the results are published in the *Bulletin* for July, 1920.*

The Hammock Forests

Within a few miles of the Sabine River the country is low and clayey and probably occasionally inundated, though the soil would hardly be classed as alluvial. These conditions are unsuited to long-leaf pine, and the forests are comparatively dense and hammock-like, with approximately the following composition:

Trees

Pinus Taeda
Liquidambar Styraciflua
Nyssa uniflora
Quercus Michauxii
Taxodium distichum
Quercus Phellos
Quercus falcata
Quercus stellata
Quercus Marylandica
Hicoria aquatica (?)

Shrubs

Cephalanthus occidentalis
Aralia spinosa

Herbs

Tillandsia usneoides

Most of these are the same species already noted as growing along streams in the pine-barrens, and this might be regarded as merely one of the strips of bottom-land timber, but for the fact that it is considerably wider on the Texas side, where it deserves to rank as a distinct region.

* Bull. Torrey Club 47: 289–319. 1920.

The foregoing notes, incomplete as they are (being based on only about eleven hours of travel), may be useful to those who may hereafter study Louisiana vegetation more intensively; and they illustrate a method of making observations in comfort in an interesting area where mosquitoes and scarcity of water might make traveling on foot rather disagreeable in summer.

THE VALUE OF NUTRIENT SOLUTIONS AS CULTURE MEDIA FOR FERN PROTHALLIA*

By Elizabeth Dorothy Wuist Brown

The value of nutrient solutions as culture media for growing fern prothallia under experimental conditions being so well known, it is the purpose of this paper to emphasize the value of these solutions for growing prothallia for class use. Excellent cultures may be obtained by using soil, peat and various other media, but it has been the writer's experience that the work is greatly simplified by the use of the nutrient solution. For after the solutions have been prepared and the cultures set up under the best light conditions available, little attention need be paid to them.

Aside from the time-saving element in caring for the cultures is the advantage of having an abundance of material in various stages of development always at hand. In this way it is possible for the student to follow the development of the prothallia from the one-cell stage to the adult form bearing antheridia, archegonia and sporophytes. This may be accomplished by varying the time of sowing the spores in the different cultures. It is well to learn the length of time required for the germination of the spores and the development of the prothallia of the particular species used before setting up the cultures for class use. The time of germination varies somewhat in different species, being more rapid in the spores containing chlorophyll.

The following solutions, Beijerinck's, Borner and Lucanus's, Knop's, Prantl's and Sachs's, proved favorable for the germina-

* Contribution from the Osborn Botanical Laboratory.